BILLING CODE 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XC560

Takes of Marine Mammals Incidental to Specified Activities; Office of Naval Research Acoustic Technology Experiments in the Western North Pacific Ocean

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; proposed incidental harassment authorization; request for comments.

SUMMARY: NMFS has received an application from the U.S. Navy's Office of Naval Research (ONR) for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to conducting Acoustic Technology Experiments (ATE) in the western North Pacific Ocean. The Navy's activities are considered military readiness activities pursuant to the Marine Mammal Protection Act (MMPA), as amended by the National Defense Authorization Act for Fiscal Year 2004 (NDAA). Pursuant to the MMPA, NMFS is requesting comments on its proposal to issue an IHA to ONR to incidentally harass, by Level B harassment only, 34 species of marine mammals during the specified activity.

DATES: Comments and information must be received no later than [insert date 30 days after date of publication in the FEDERAL REGISTER].

ADDRESSES: Comments on the application should be addressed to P. Michael Payne, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910. The mailbox address for

providing email comments is ITP.Magliocca@noaa.gov. NMFS is not responsible for e-mail comments send to addresses other than the one provided here. Comments sent via email, including all attachments, must not exceed a 10-megabyte file size.

All comments received are a part of the public record and will generally be posted to http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications without change. All Personal Identifying Information (for example, name, address, etc.) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

An electronic copy of the application containing a list of the references used in this document may be obtained by visiting the internet at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications. Documents cited in this notice may be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Michelle Magliocca, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Background

Section 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 et seq.) direct the Secretary of Commerce to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring, and reporting of such takings are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as "…an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Section 101(a)(5)(D) of the MMPA established an expedited process by which U.S. citizens can apply for a 1-year authorization to incidentally take small numbers of marine mammals by harassment, provided that there is no potential for serious injury or mortality to result from the activity. Section 101(a)(5)(D) establishes a 45-day time limit for NMFS' review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny the authorization.

The NDAA (Public Law 108–136) removed the ''small numbers'' and "specified geographical region'' limitations and amended the definition of ''harassment'' as it applies to a ''military readiness activity'' to read as follows (section 3(18)(B) of the MMPA): (i) Any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild [Level A Harassment]; or (ii) Any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or

sheltering, to a point where such behavioral patterns are abandoned or significantly altered [Level B Harassment].]

Summary of Request

On December 20, 2012, NMFS received an application from ONR for the taking of marine mammals incidental to ATE in the western North Pacific Ocean. ONR provided additional information on March 7, 2013 and NMFS determined that the application was adequate and complete on March 7, 2013.

ONR proposes to conduct ATE in one of nine provinces comprising the western North Pacific Ocean. The proposed activity would occur for no more than 2 weeks during the spring or summer of 2013. Transmissions from four underwater active acoustic sources are likely to result in the take of marine mammals. Take, by Level B harassment only, of individuals of up to 34 species is anticipated to result from the specified activity.

Description of the Specified Activity

The purpose of ONR's ATE is to collect data and demonstrate underwater acoustic technology in a realistic at-sea environment. The proposed activity fulfills the Navy's need for measured in situ scientific data on underwater acoustic technology from which the performance of the acoustic systems and their conceptual foundation can be assessed. No more than four underwater acoustic sources would be used from a vessel during the experiments and none of the sources would transmit concurrently. The acoustic sources are considered non-impulsive and non-continuous and no explosives would be used. All transmission frequencies would be below 1.5 kilohertz (kHz) and sound pressure levels would be less than 220 decibels (dB) (significantly lower than tactical mid-frequency or low-frequency active sonar) for a total of no more than 69 hours of acoustic transmissions over 6 days. Despite being classified, the detailed characteristics

of the active acoustic sources were made known to NMFS staff and factored into our MMPA analysis. An environmental survey of the waters of the proposed action area would also be conducted employing an oceanographic acoustic source. The vessel would be stationary during deployment and transmission of the ATE underwater active acoustic sources, except that of the oceanographic acoustic source. The vessel would move at speeds less than 5 knots when the oceanographic source is transmitting. All equipment deployed during the ATE would be recovered once data collection is complete.

Dates and Duration of Activity

The ATE would take place during the spring or summer of 2013, and would last no longer than 2 weeks. No more than 69 hours of acoustic transmissions would occur over 6 at-sea days. The Navy is unable to define a detailed schedule of events because experimental work, such as the proposed activity, requires a degree of flexibility to respond to weather fluctuations and hardware conditions. However, a nominal outline of a schedule, including the amount of time each source would be expected to be used, and the possibility of temporal overlap in source transmissions has been planned (Table 1). At most, two of the acoustic sources would operate at the same time during specific experiment events. In all cases of concurrent source operations, there is sufficient horizontal and vertical separation between the active acoustic sources so that potential environmental effects associated with the operation of the sources is no more than the sources considered individually.

Table 1. Nominal schedule of ONR ATE activities and events.

Day	Activity	Equipment	Acoustic Transmission
1	Environmental Survey	Oceanographic Source	One 24-hr event

	Experimental Transmissions	Sources 1 or 2 or 3	Maximum 1-hr per source
2	Experimental Transmissions	Source 1	Two 9-hr events
3	Experimental Transmissions	Source 2	One 5-hr event
4	Experimental Transmissions	Source 3	Two 10-hr events
5	Experimental Transmissions	Source 2	Two 5-hr events
6	Experimental Transmissions	Source 2	One 5-hr events
		Sources 1 or 3 (contin-gency day)	Two 4-hr events

Location of Activity

The ATE would take place in international waters, in one of nine provinces comprising the western North Pacific Ocean. The nine provinces are discrete areas identified with the following geographic titles: Sea of Japan, East China Sea, South China Sea, North Philippine Sea, West Philippine Sea, East of Japan, Offshore Guam, Northwest Pacific Ocean: 25° to 40° north latitude, or Northwest Pacific Ocean: 10° to 25° north latitude. The proposed action area would be between 360,000-800,000 square kilometers (km^2) and water could be as shallow as 100 m or as deep as 9,500 m (Table 2).

Table 2. Size and range of water depths for the western North Pacific provinces in which the ATE may occur.

Western North Pacific Province	Area (km^2)	Water Depth Range (m)
Sea of Japan	360,000	1,000-3,500
East China Sea	370,000	100-2,500
South China Sea	800,000	100-4,500

North Philippine Sea	500,000	1,000-5,500
West Philippine Sea	400,000	1,500-7,500
East of Japan	600,000	5,000-6,000
Offshore Guam	470,000	500-9,500
Northwest Pacific Ocean - 25° to 40°N	560,000	2,500-6,000
Northwest Pacific Ocean - 10° to 25°N	450,000	1,500-6,000

Metrics Used in This Document

This section includes a brief explanation of the sound measurements frequently used in the discussions of acoustic effects in this document. Sound pressure is the sound force per unit area, and is usually measured in micropascals (μPa), where 1 pascal (Pa) is the pressure resulting from a force of one newton exerted over an area of one square meter. Sound pressure level (SPL) is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in underwater acoustics is 1 μPa, and the units for SPLs are dB re: 1 μPa.

SPL (in decibels (dB)) = 20 log (pressure/reference pressure)

SPL is an instantaneous measurement and can be expressed as the peak, the peak-peak (p-p), or the root mean square (rms). RMS, which is the square root of the arithmetic average of the squared instantaneous pressure values, is typically used in discussions of the effects of sounds on vertebrates and all references to SPL in this document refer to the root mean square unless otherwise noted. SPL does not take the duration of a sound into account.

Marine Mammals in the Area of the Proposed Activity

Thirty-four marine mammal species may potentially occur in at least one of the nine provinces comprising the western North Pacific Ocean in which the ATE may occur. Eight of these species are listed as endangered under the U.S. Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 et seq.) and depleted under the MMPA: blue whale (Balaenoptera musculus), fin whale (Balaenoptera physalus), gray whale (Eschrichtius robustus), humpback whale (Megaptera novaeangliae), North Pacific right whale (Eubalaena japonica), sei whale (Balaenoptera borealis), sperm whale (Physeter macrocephalus), and Hawaiian monk seal (Monachus schauinslandi). Although 34 species of marine mammals may potentially occur in the waters of the nine western North Pacific provinces, the two species of Kogia are often considered together due to the difficulty in identifying these animals to the species level at sea and the sparse information that is known about the individual species. The 34 species considered include eight mysticetes, 25 odontocetes, and one pinniped (Table 3)

Table 3. Marine mammals potentially occurring in the nine provinces of the western North Pacific where the ATE may be conducted and their status.

Common Name	Scientific Name	ESA and MMPA Status
Mysticetes		
Blue Whale	Balaenoptera musculus	Endangered/Depleted
Bryde's Whale	Balaenoptera edeni	-
Common Minke Whale	Balaenoptera acutoros-trata	-
Fin Whale	Balaenoptera physalus	Endangered/Depleted
Gray Whale	Eschrichtius robustus	Endangered/Depleted[1]
Humpback Whale	Megaptera novaean-gliae	Endangered/Depleted

North Pacific Right Whale	Eubalaena japonica	Endangered/Depleted
Sei Whale	Balaenoptera borealis	Endangered/Depleted
Odontocetes		
Baird's Beaked Whale	Berardius bairdii	-
Blainville's Beaked Whale	Mesoplodon densirostris	-
Common Bottlenose Dolphin	Tursiops truncatus	-
Cuvier's Beaked Whale	Ziphius cavirostris	-
Dall's Porpoise	Phocoenoides dalli	-
False killer whale	Pseudorca crassidens[2]	-
Fraser's Dolphin	Lagenodelphis hosei	-
Ginkgo-toothed Beaked Whale	Mesoplodon ginkgodens	-
Hubbs' Beaked Whale	Mesoplodon carhubbsi	-
Killer Whale	Orca orcinus	-
Kogia spp.		-
Longman's Beaked Whale	Indopacetus pacificus	-
Melon-headed Whale	Peponocephala electra	-
Pacific White-sided Dolphin	Lagenorhynchus obliquidens	-
Pantropical Spotted Dolphin	Stenella attenuata	-
Pygmy Killer Whale	Feresa attenuata	-
Risso's Dolphin	Grampus griseus	-

Rough-toothed Dolphin	Steno bredanensis	-
Short-beaked Common Dolphin	Delphinus delphis	-
Short-finned Pilot Whale	Globicephala macrorhynchus	-
Sperm Whale	Physeter macrocephalus	Endangered/Depleted
Spinner Dolphin	Stenella longirostris	-
Stejneger's Beaked Whale	Mesoplodon stejnegeri	-
Striped Dolphin	Stenella coeruleoalba	-
Pinnipeds		
Hawaiian Monk Seal	Monachus schauins-landi	Endangered/Depleted

[1] Only the western Pacific population is listed as endangered under the ESA.
[2] As a species, the false killer whale is not listed under the ESA; however, the insular Main Hawaiian Islands distinct population segment (DPS) of false killer whales is listed as endangered under the ESA.

The distribution and densities of cetaceans and pinnipeds are highly "patchy." Patchy distributions are characterized by irregular clusters (patches) of occurrence that can frequently be correlated with that of their prey, which often are associated with productive continental shelves, ocean fronts, upwelling areas, bathymetric relief, or water mass convergence areas (Katona and Whitehead, 1998). Movements of marine mammals are often related to feeding or breeding activity. Some baleen whale species, such as humpback whales, make extensive annual migrations to low-latitude mating and calving grounds in the coldest months and high-latitude feeding grounds in the warmest season (Corkeron and Connor, 1999). Several cetacean species undergo seasonal north-south migrations that track peaks in prey availability while others reside year-round in specific areas. Some of the cetacean species potentially occurring in one of the

nine provinces of the western North Pacific, such as the North Pacific right whale, only occur seasonally while most others occur year-round.

Density estimates were derived for each marine mammal species potentially occurring in the nine provinces of the western North Pacific in which the ONR ATE may occur during the spring or summer (Tables 4-13). The process for developing density estimates was a multi-step procedure. Direct estimates from line-transect surveys that occurred in or near the experiment area were utilized first (e.g., Buckland et al., 1992). However, density estimates from line-transect surveys in the western North Pacific were not always available for each species. When density estimates were not available from a survey in the western North Pacific, then density estimates from a region with similar oceanographic characteristics were extrapolated to those provinces. For example, the eastern tropical Pacific has been extensively surveyed and provides a comprehensive understanding of marine mammals in warm temperate oceanic waters, so density estimates from this well-studied ocean region were sometimes used to derive density estimates for the nine provinces (Ferguson and Barlow, 2001, 2003). Furthermore, density estimates are sometimes pooled for species of the same genus if sufficient data are not available to compute a density for individual species or the species are difficult to distinguish at sea. This is often the case for pygmy and dwarf sperm whales (Kogia spp.); density estimates are available for these species groups rather than individual species.

Table 4. Marine mammal density estimates for the Sea of Japan.[1]

Species	Spring Density Estimate (animals/km^2)	Summer Density Estimate (animals/km^2)	References for Density Estimates
Mysticetes			

Bryde's Whale	0.0004	0.0004	Ferguson and Barlow, 2001 and 2003
Common Minke Whale	0.0002	0.0002	Ferguson and Barlow, 2001 and 2003
Common Minke Whale - JStock	0.0009	0.0009	Pastene et al., 1998
Fin Whale	0.0001	0.0001	Ferguson and Barlow, 2001 and 2003
Gray Whale	<0.00001	<0.00001	
North Pacific Right Whale	<0.00001		
Odontocetes			
Baird's Beaked Whale	0.0003	0.0003	Ferguson and Barlow, 2001 and 2003
Common Bottlenose Dolphin	0.0008	0.0008	LGL, 2011
Cuvier's Beaked Whale	0.0031	0.0031	Ferguson and Barlow, 2001 and 2003
Dall's Porpoise	0.0520	0.0520	Ferguson and Barlow, 2001 and 2003
False Killer Whale	0.0027	0.0027	Ferguson and Barlow, 2001 and 2003
Killer Whale	0.0001	0.0001	LGL, 2011
Kogia spp.	0.0017	0.0017	Ferguson and Barlow, 2001 and 2003
Pacific White-sided Dolphin	0.0030		Ferguson and Barlow, 2001 and 2003
Risso's Dolphin	0.0073	0.0073	Miyashita, 1993
Rough-toothed Dolphin	0.00355	0.00355	Barlow, 2006
Short-beaked Common Dolphin	0.0860	0.0860	Ferguson and Barlow, 2001 and 2003

Short-finned Pilot Whale	0.0014	0.0014	Miyashita, 1993
Sperm Whale	0.0012	0.0012	Fulling et al., 2011
Spinner Dolphin		0.00083	Barlow, 2006
Stejneger's Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003
Striped Dolphin	0.0058	0.0058	LGL, 2011

[1]In Tables 4 through 13, a blank space during a season indicates that the species does not occur in those waters during that season. A density of <0.00001 in any of the tables indicates that there are no occurrence data for that species sufficient to quantify or from which to extrapolate a density; in these instances, a "default" density of <0.00001 was used so that harassment estimates could be quantified.

Table 5. Marine mammal density estimates for the East China Sea.

Species	Spring Density Estimate (animals/km^2)	Summer Density Estimate (animals/km^2)	References for Density Estimates
Mysticetes			
Bryde's Whale	0.0006	0.0006	Ohsumi, 1977
Common Minke Whale	0.0044	0.0044	Buckland et al., 1992
Common Minke Whale-J Stock	0.0018	0.0018	Pastene et al., 1998
Fin Whale	0.0002	0.0002	Tillman, 1977
Gray Whale	<0.00001		
North Pacific Right Whale	<0.00001		
Odontocetes			
Blainville's Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003
Common Bottlenose Dolphin	0.0008	0.0008	LGL, 2011
Cuvier's Beaked Whale	0.0003	0.0003	Ferguson and Barlow, 2001 and 2003
False Killer Whale	0.0011	0.0011	Fulling et al., 2011

Fraser's Dolphin	0.00417	0.00417	Barlow, 2006
Ginkgo-toothed Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003
Killer Whale	0.0001	0.0001	LGL, 2011
Kogia spp.	0.0017	0.0017	Ferguson and Barlow, 2001 and 2003
Longman's Beaked Whale	0.00025	0.00025	LGL, 2011
Melon-headed Whale	0.0043	0.0043	Fulling et al., 2011
Pacific White-sided Dolphin	0.0028		Ferguson and Barlow, 2001 and 2003
Pantropical Spotted Dolphin	0.0137	0.0137	Miyashita, 1993
Pygmy Killer Whale	0.0001	0.0001	Fulling et al., 2011
Risso's Dolphin	0.0106	0.0106	Miyashita, 1993
Rough-toothed Dolphin	0.00355	0.00355	Barlow, 2006
Short-beaked Common Dolphin	0.0461	0.0461	Ferguson and Barlow, 2001 and 2003
Short-finned Pilot Whale	0.0016	0.0016	Fulling et al., 2011
Sperm Whale	0.0012	0.0012	Fulling et al., 2011
Spinner Dolphin	0.00083	0.00083	Barlow, 2006
Striped Dolphin	0.0058	0.0058	LGL, 2011

Table 6. Marine mammal density estimates for the South China Sea.

Species	Spring Density Estimate (animals/km^2)	Summer Density Estimate (animals/km^2)	References for Density Estimates
Mysticetes			

Bryde's Whale	0.0006	0.0006	Ohsumi, 1977
Common Minke Whale	0.0033	0.0033	Buckland et al., 1992
Fin Whale	0.0002	0.0002	Tillman, 1977
Gray Whale	<0.00001		
North Pacific Right Whale	<0.00001		
Odontocetes			
Blainville's Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003
Common Bottlenose Dolphin	0.0008	0.0008	LGL, 2011
Cuvier's Beaked Whale	0.0003	0.0003	Ferguson and Barlow, 2001 and 2003
False Killer Whale	0.0011	0.0011	Fulling et al., 2011
Fraser's Dolphin	0.00417	0.00417	Barlow, 2006
Ginkgo-toothed Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003
Killer Whale	0.0001	0.0001	LGL, 2011
Kogia spp.	0.0017	0.0017	Ferguson and Barlow, 2001 and 2003
Longman's Beaked Whale	0.00025	0.00025	LGL, 2011
Melon-headed Whale	0.0043	0.0043	Fulling et al., 2011
Pantropical Spotted Dolphin	0.0137	0.0137	Miyashita, 1993
Pygmy Killer Whale	0.0001	0.0001	Fulling et al., 2011
Risso's Dolphin	0.0106	0.0106	Miyashita, 1993
Rough-toothed Dolphin	0.00355	0.00355	Barlow, 2006
Short-finned Pilot Whale	0.0016	0.0016	Fulling et al., 2011

Sperm Whale	0.0012	0.0012	Fulling et al., 2011
Spinner Dolphin	0.00083	0.00083	Barlow, 2006
Striped Dolphin	0.0058	0.0058	LGL, 2011

Table 7. Marine mammal density estimates for the North Philippine Sea.

Species	Spring Density Estimate (animals/km^2)	Summer Density Estimate (animals/km^2)	References for Density Estimates
Mysticetes			
Blue Whale	0.00001		Ferguson and Barlow, 2001 and 2003
Bryde's Whale	0.0006	0.0006	Ohsumi, 1977
Common Minke Whale	0.0044	0.0044	Buckland et al., 1992
Fin Whale	0.0002		Tillman, 1977
Humpback Whale	0.00089		LGL, 2008
North Pacific Right Whale	<0.00001		
Odontocetes			
Blainville's Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003
Common Bottlenose Dolphin	0.0146	0.0146	Miyashita, 1993
Cuvier's Beaked Whale	0.0054	0.0054	Ferguson and Barlow, 2001 and 2003
False Killer Whale	0.0029	0.0029	Miyashita, 1993
Fraser's Dolphin	0.00417	0.00417	Barlow, 2006
Ginkgo-toothed Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003

Killer Whale	0.0001	0.0001	LGL, 2011
Kogia spp.	0.0031	0.0031	Ferguson and Barlow, 2001 and 2003
Longman's Beaked Whale	0.00025	0.00025	LGL, 2011
Melon-headed Whale	0.00428	0.00428	Fulling et al., 2011
Pacific White-sided Dolphin	0.0119		Ferguson and Barlow, 2001 and 2003
Pantropical Spotted Dolphin	0.0137	0.0137	Miyashita, 1993
Pygmy Killer Whale	0.0021	0.0021	Ferguson and Barlow, 2001 and 2003
Risso's Dolphin	0.0106	0.0106	Miyashita, 1993
Rough-toothed Dolphin	0.0059	0.0059	Ferguson and Barlow, 2001 and 2003
Short-beaked Common Dolphin	0.0562	0.0562	Ferguson and Barlow, 2001 and 2003
Short-finned Pilot Whale	0.0153	0.0153	Miyashita, 1993
Sperm Whale	0.0012	0.0012	Fulling et al., 2011
Spinner Dolphin	0.00083	0.00083	Barlow, 2006
Striped Dolphin	0.0329	0.0329	Miyashita, 1993

Table 8. Marine mammal density estimates for the West Philippine Sea.

Species	Spring Density Estimate (animals/km^2)	Summer Density Estimate (animals/km^2)	References for Density Estimates
Mysticetes			
Blue Whale	0.00001		Ferguson and Barlow, 2001 and 2003

Bryde's Whale	0.0006	0.0006	Ohsumi, 1977
Common Minke Whale	0.0033	0.0033	Buckland et al., 1992
Fin Whale	0.0002		Tillman, 1977
Humpback Whale	0.00089		LGL, 2008
Odontocetes			
Blainville's Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003
Common Bottlenose Dolphin	0.0146	0.0146	Miyashita, 1993
Cuvier's Beaked Whale	0.0003	0.0003	Ferguson and Barlow, 2001 and 2003
False Killer Whale	0.0029	0.0029	Miyashita, 1993
Fraser's Dolphin	0.00417	0.00417	Barlow, 2006
Ginkgo-toothed Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003
Killer Whale	0.0001	0.0001	LGL, 2011
Kogia spp.	0.0017	0.0017	Ferguson and Barlow, 2001 and 2003
Longman's Beaked Whale	0.00025	0.00025	LGL, 2011
Melon-headed Whale	0.00428	0.00428	Fulling et al., 2011
Pantropical Spotted Dolphin	0.0137	0.0137	Miyashita, 1993
Pygmy Killer Whale	0.0021	0.0021	Ferguson and Barlow, 2001 and 2003
Risso's Dolphin	0.0106	0.0106	Miyashita, 1993
Rough-toothed Dolphin	0.0059	0.0059	Ferguson and Barlow, 2001 and 2003
Short-finned Pilot Whale	0.0076	0.0076	Miyashita, 1993

Sperm Whale	0.0012	0.0012	Fulling et al., 2011
Spinner Dolphin	0.00083	0.00083	Barlow, 2006
Striped Dolphin	0.0164	0.0164	Miyashita, 1993

Table 9. Marine mammal density estimates for the East of Japan.

Species	Spring Density Estimate (animals/km^2)	Summer Density Estimate (animals/km^2)	References for Density Estimates
Mysticetes			
Bryde's Whale	0.0006	0.0006	Ohsumi, 1977
Common Minke Whale	0.0022	0.0022	Buckland et al., 1992
Fin Whale		0.0002	Tillman, 1977
North Pacific Right Whale	<0.00001		
Sei Whale	0.0006	0.0006	Tillman, 1977
Odontocetes			
Baird's Beaked Whale	0.0029	0.0029	Kasuya, 1986
Common Bottlenose Dolphin	0.0171	0.0171	Miyashita, 1993
Cuvier's Beaked Whale	0.0031	0.0031	Ferguson and Barlow, 2001 and 2003
False Killer Whale	0.0036	0.0036	Miyashita, 1993
Ginkgo-toothed Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003
Hubbs' Beaked Whale	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003
Killer Whale	0.0001	0.0001	LGL, 2011

Kogia spp.	0.0031	0.0031	Ferguson and Barlow, 2001 and 2003
Pacific White-sided Dolphin	0.0082	0.0082	Ferguson and Barlow, 2001 and 2003
Pantropical Spotted Dolphin		0.0259	Miyashita, 1993
Pygmy Killer Whale	0.0021	0.0021	Ferguson and Barlow, 2001 and 2003
Risso's Dolphin	0.0097	0.0097	Miyashita, 1993
Rough-toothed Dolphin	0.0059	0.0059	Ferguson and Barlow, 2001 and 2003
Short-beaked Common Dolphin	0.0761	0.0761	Ferguson and Barlow, 2001 and 2003
Short-finned Pilot Whale	0.0128	0.0128	Miyashita, 1993
Sperm Whale	0.0012	0.0012	Fulling et al., 2011
Spinner Dolphin		0.00083	Barlow, 2006
Striped Dolphin	0.0111	0.0111	Miyashita, 1993

Table 10. Marine mammal density estimates for Offshore Guam.

Species	Spring Density Estimate (animals/km^2)	Summer Density Estimate (animals/km^2)	References for Density Estimates
Mysticetes			
Blue Whale	0.00001		Ferguson and Barlow, 2001 and 2003
Bryde's Whale	0.00041	0.00041	Fulling et al., 2011
Common Minke Whale	0.0003		Ferguson and Barlow, 2001 and 2003

Fin Whale	0.00001		Ferguson and Barlow, 2001 and 2003
Humpback Whale	0.00089		LGL, 2008
Sei Whale	0.00029		Fulling et al., 2011
Odontocetes			
Blainville's Beaked Whale	0.00117	0.00117	Barlow, 2006
Common Bottlenose Dolphin	0.00131	0.00131	Barlow, 2006
Cuvier's Beaked Whale	0.0062	0.0062	Barlow, 2006
Dwarf Sperm Whale	0.0071	0.0071	Barlow, 2006
False Killer Whale	0.00111	0.00111	Fulling et al., 2011
Fraser's Dolphin	0.00417	0.00417	Barlow, 2006
Ginkgo-toothed Beaked Whale	0.00093	0.00093	Ferguson and Barlow, 2001 and 2003
Killer Whale	0.00014	0.00014	Barlow, 2006
Longman's Beaked Whale	0.00041	0.00041	Barlow, 2006
Melon-headed Whale	0.00428	0.00428	Fulling et al., 2011
Pantropical Spotted Dolphin	0.0226	0.0226	Fulling et al., 2011
Pygmy Killer Whale	0.00014	0.00014	Fulling et al., 2011
Pygmy Sperm Whale	0.0029	0.0029	Barlow, 2006
Risso's Dolphin	0.00097	0.00097	Barlow, 2006
Rough-toothed Dolphin	0.00335	0.00335	Barlow, 2006
Short-finned Pilot Whale	0.00362	0.00362	Barlow, 2006
Sperm Whale	0.0012	0.0012	Fulling et al., 2011
Spinner Dolphin	0.0008	0.0008	Barlow, 2006

Striped Dolphin	0.00616	0.00616	Fulling et al., 2011

Table 11. Marine mammal density estimates for the Northwest Pacific Ocean (25° to 40°N).

Species	Spring Density Estimate (animals/km^2)	Summer Density Estimate (animals/km^2)	References for Density Estimates
Mysticetes			
Bryde's Whale	0.00041	0.00041	Fulling et al., 2011
Common Minke Whale	0.0003	0.0003	Buckland et al., 1992
Fin Whale		0.0001	Tillman, 1977
Sei Whale	0.00029	0.00029	Fulling et al., 2011
Odontocetes			
Baird's Beaked Whale	0.0001	0.0001	Kasuya, 1986
Blainville's Beaked Whale	0.0007	0.0007	LGL, 2011
Common Bottlenose Dolphin	0.0008	0.0008	LGL, 2011
Cuvier's Beaked Whale	0.0037	0.0037	LGL, 2011
Dwarf Sperm Whale	0.0043	0.0043	LGL, 2011
False Killer Whale	0.0001	0.0001	Miyashita, 1993
Hubbs' Beaked Whale	0.0007	0.0007	Ferguson and Barlow, 2001 and 2003
Killer Whale	0.0008	0.0008	LGL, 2011
Longmans' Beaked Whale	0.0037	0.0037	LGL, 2011
Melon-headed Whale	0.0043	0.0043	LGL, 2011
Mesoplodon spp.	0.0005	0.0005	Ferguson and Barlow, 2001 and 2003

Pacific White-sided Dolphin	0.0048	0.0048	Ferguson and Barlow, 2001 and 2003
Pantropical Spotted Dolphin	0.0113	0.0113	LGL, 2011
Pygmy Killer Whale	0.0001	0.0001	LGL, 2011
Pygmy Sperm Whale	0.0018	0.0018	LGL, 2011
Risso's Dolphin	0.0005	0.0005	LGL, 2011
Rough-toothed Dolphin	0.0019	0.0019	LGL, 2011
Short-beaked Common Dolphin	0.0863	0.0863	Ferguson and Barlow, 2001 and 2003
Short-finned Pilot Whale	0.0021	0.0021	LGL, 2011
Sperm Whale	0.0022	0.0022	LGL, 2011
Spinner Dolphin	0.0019	0.0019	LGL, 2011
Striped Dolphin	0.0058	0.0058	LGL, 2011
Pinnipeds			
Hawaiian Monk Seal	<0.00001	<0.00001	

Table 12. Marine mammal density estimates for the Northwest Pacific Ocean (10° to 25°N).

Species	Spring Density Estimate (animals/km^2)	Summer Density Estimate (animals/km^2)	References for Density Estimates
Mysticetes			
Blue Whale	0.00001		Ferguson and Barlow, 2001 and 2003
Bryde's Whale	0.0003	0.0003	LGL, 2011
Fin Whale	0.00001		Ferguson and Barlow, 2001 and 2003

Sei Whale	0.0001		LGL, 2011
Odontocetes			
Blainville's Beaked Whale	0.0007	0.0007	LGL, 2011
Common Bottlenose Dolphin	0.0008	0.0008	LGL, 2011
Cuvier's Beaked Whale	0.0037	0.0037	LGL, 2011
Dwarf Sperm Whale	0.0043	0.0043	LGL, 2011
False Killer Whale	0.0006	0.0006	LGL, 2011
Fraser's Dolphin	0.0025	0.0025	LGL, 2011
Killer Whale	0.0001	0.0001	LGL, 2011
Longman's Beaked Whale	0.00025	0.00025	LGL, 2011
Melon-headed Whale	0.0027	0.0027	LGL, 2011
Pantropical Spotted Dolphin	0.0113	0.0113	LGL, 2011
Pygmy Killer Whale	0.0001	0.0001	LGL, 2011
Pygmy Sperm Whale	0.0018	0.0018	LGL, 2011
Risso's Dolphin	0.0005	0.0005	LGL, 2011
Rough-toothed Dolphin	0.0019	0.0019	LGL, 2011
Short-finned Pilot Whale	0.0021	0.0021	LGL, 2011
Sperm Whale	0.0022	0.0022	LGL, 2011
Spinner Dolphin	0.0019	0.0019	LGL, 2011
Striped Dolphin	0.0058	0.0058	LGL, 2011

Species-specific information on marine mammals potentially occurring in at least one of the nine provinces of the western North Pacific Ocean is provided in ONR's application

(http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications). Refer to section 4.0 of their application for detailed information regarding biological characteristics, natural phenomenon, and interaction with anthropogenic activity.

Potential Effects of the Specified Activity on Marine Mammals

Acoustic stimuli generated by underwater signals from no more than four acoustic sources have the potential to cause Level B harassment of marine mammals in the proposed action area. The impacts to marine mammals from these sources are expected to be limited to some masking effects and behavioral responses in the areas ensonified by the acoustic sources.

Permanent hearing impairment, in the unlikely event that it occurrs, would constitute injury, but temporary threshold shift (TTS) is considered a type of Level B harassment (Southall et al., 2007). Although the possibility cannot be entirely excluded, it is unlikely that the proposed demonstration would result in any cases of temporary or permanent hearing impairment, or any significant non-auditory physical or physiological effects. Based on the available data and studies described here, some behavioral disturbance is possible, but NMFS expects the disturbance to be localized and short-term.

Tolerance to Sound

Studies on marine mammal tolerance to sound in the natural environment are relatively rare. Richardson et al. (1995) defines tolerance as the occurrence of marine mammals in areas where they are exposed to human activities or man-made noise. In many cases, tolerance develops by the animal habituating to the stimulus (i.e., the gradual waning of responses to a repeated or ongoing stimulus) (Richardson et al., 1995; Thorpe, 1963), but because of ecological or physiological requirements, many marine animals may need to remain in areas where they are exposed to chronic stimuli (Richardson et al., 1995).

Masking of Natural Sounds

The term masking refers to the inability of a subject to recognize the occurrence of an acoustic stimulus as a result of the interference of another acoustic stimulus (Clark et al., 2009). Marine mammals are highly dependent on sound, and their ability to recognize sound signals amid other noise is important in communication, predator and prey detection, and, in the case of toothed whales, echolocation. Introduced underwater sound may, through masking, reduce the effective communication distance of a marine mammal species if the frequency of the source is close to that used as a signal by the marine mammal, and if the anthropogenic sound is present for a significant fraction of the time (Richardson et al., 1995). Even in the absence of manmade sounds, the sea is usually noisy. Background ambient noise often interferes with or masks the ability of an animal to detect a sound signal even when that signal is above its absolute hearing threshold. Natural ambient noise includes contributions from wind, waves, precipitation, other animals, and (at frequencies above 30 kHz) thermal noise resulting from molecular agitation (Richardson et al., 1995). Background noise can also include sounds from human activities. Masking of natural sounds can result when human activities produce high levels of background noise. Conversely, if the background level of underwater noise is high, (e.g., on a day with strong wind and high waves), an anthropogenic noise source will not be detectable as far away as would be possible under quieter conditions and will itself be masked.

Acoustic masking from low-frequency ocean noise is increasingly being considered as a threat, especially to low-frequency hearing specialists such as baleen whales (Clark et al., 2009). It is not currently possible to determine with precision the potential consequences of temporary or local background noise levels. However, Parks et al. (2007) found that right whales altered their vocalizations, possibly in response to background noise levels. For species that can hear

over a relatively broad frequency range, as is presumed to be the case for mysticetes, a narrow band source may only cause partial masking. Richardson et al. (1995a) note that a bowhead whale 20 km from a human sound source might hear strong calls from other whales within approximately 20 km, and a whale 5 km from the source might hear strong calls from whales within approximately 5 km. Additionally, masking is more likely to occur closer to a sound source, and distant anthropogenic sound is less likely to mask short-distance acoustic communication (Richardson et al., 1995a).

Redundancy and context can also facilitate detection of weak signals. These phenomena may help marine mammals detect weak sounds in the presence of natural or manmade noise. Most masking studies in marine mammals present the test signal and the masking noise from the same direction. The sound localization abilities of marine mammals suggest that, if signal and noise come from different directions, masking would not be as severe as the usual types of masking studies might suggest (Richardson et al., 1995). The dominant background noise may be highly directional if it comes from a particular anthropogenic source such as a ship or industrial site. Directional hearing may significantly reduce the masking effects of these noises by improving the effective signal-to-noise ratio. In the cases of high-frequency hearing by the bottlenose dolphin, beluga whale, and killer whale, empirical evidence confirms that masking depends strongly on the relative directions of arrival of sound signals and the masking noise (Penner et al., 1986; Dubrovskiy, 1990; Bain et al., 1993; Bain and Dahlheim, 1994).

Toothed whales, and probably other marine mammals as well, have additional capabilities besides directional hearing that can facilitate detection of sounds in the presence of background noise. There is evidence that some toothed whales can shift the dominant frequencies of their echolocation signals from a frequency range with a lot of ambient noise

toward frequencies with less noise (Au et al., 1974, 1985; Moore and Pawloski, 1990; Thomas and Turl, 1990; Romanenko and Kitain, 1992; Lesage et al., 1999). A few marine mammal species are known to increase the source levels or alter the frequency of their calls in the presence of elevated sound levels (Dahlheim, 1987; Au, 1993; Lesage et al., 1993, 1999; Terhune, 1999; Foote et al., 2004; Parks et al., 2007, 2009; Di Iorio and Clark, 2009; Holt et al., 2009).

These adaptations for reduced masking pertain mainly to the very high-frequency echolocation signals of toothed whales. There is less information about the existence of corresponding mechanisms at moderate or low frequencies or in other types of marine mammals. For example, Zaitseva et al. (1980) found that, for the bottlenose dolphin, the angular separation between a sound source and a masking noise source had little effect on the degree of masking when the sound frequency was 18 kHz, in contrast to the pronounced effect at higher frequencies. Directional hearing has been demonstrated at frequencies as low as 0.5-2 kHz in several marine mammals, including killer whales (Richardson et al., 1995). This ability may be useful in reducing masking at these frequencies. In summary, high levels of noise generated by anthropogenic activities may act to mask the detection of weaker biologically important sounds by some marine mammals. This masking may be more prominent for lower frequencies.

Behavioral Disturbance

Behavioral disturbance includes a variety of effects, including subtle to conspicuous changes in behavior, movement, and displacement. Marine mammal reactions to sound, if any, depend on species, state of maturity, experience, current activity, reproductive state, time of day, and many other factors (Richardson et al., 1995; Wartzok et al., 2004; Southall et al., 2007; Weilgart, 2007). If a marine mammal does react briefly to an underwater sound by changing its

behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (e.g., Lusseau and Bejder, 2007; Weilgart, 2007). Given the many uncertainties in predicting the quantity and types of impacts of noise on marine mammals, it is common practice to estimate how many marine mammals would be present within a particular proximity to activities and/or exposed to a particular level of sound. In most cases, this approach likely overestimates the numbers of marine mammals that would be affected in some biologically-important manner. A summary of observed marine mammal behavioral changes to sonar and low-frequency sound sources are provided below. They potential effects to marine mammals described in this section of the document do not take into consideration the proposed monitoring and mitigation measures described later in this document (see the "Proposed Mitigation" and "Proposed Monitoring and Reporting" sections).

Low-frequency signals of the Acoustic Thermometry of Ocean Climate sound source were not found to affect dive times of humpback whales in Hawaiian waters (Frankel and Clark, 2000). Balaenopterid whales exposed to moderate SURTASS LFA sonar demonstrated no responses or change in foraging behavior that could be attributed to the low-frequency sounds (Croll et al., 2001), whereas five out of six North Atlantic right whales exposed to an acoustic alarm interrupted their foraging dives (Nowacek et al., 2004). Although the received sound pressure level was similar in the latter two studies, the frequency, duration, and temporal pattern of signal presentation were different. These factors, as well as differences in species sensitivity, are likely contributing factors to the differential response. A determination of whether foraging disruptions incur fitness consequences will require information on or estimates of the energetic

requirements of the individuals and the relationship between prey availability, foraging effort and success, and the life history of the animal.

Social interactions between mammals can be affected by noise via the disruption of communication signals or by the displacement of individuals. In one study, sperm whales responded to military sonar, apparently from a submarine, by dispersing from social aggregations, moving away from the sound source, remaining relatively silent, and becoming difficult to approach (Watkins et al., 1985). In contrast, sperm whales in the Mediterranean that were exposed to submarine sonar continued calling (J. Gordon pers. comm. cited in Richardson et al., 1995). Social disruptions must be considered, however, in context of the relationships that are affected. While some disruptions may not have deleterious effects, long-term or repeated disruptions of mother/calf pairs or interruption of mating behaviors have the potential to affect the growth and survival or reproductive effort/success of individuals.

Vocal changes in response to anthropogenic noise can occur across the repertoire of sound production modes used by marine mammals, such as whistling, echolocation click production, calling, and singing. Changes may result in response to a need to compete with an increase in background noise or may reflect an increased vigilance or startle response. For example, in the presence of low-frequency active sonar, humpback whales have been observed to increase the length of their "songs" (Miller et al., 2000; Fristrup et al., 2003), possibly due to the overlap in frequencies between the whale song and the low-frequency active sonar. A similar compensatory effect for the presence of low-frequency vessel noise has been suggested for right whales; right whales have been observed to shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks et al., 2007). Killer whales off the northwestern coast of the United States have been observed to increase the

duration of primary calls once a threshold in observing vessel density (e.g., whale watching) was reached, which has been suggested as a response to increased masking noise produced by the vessels (Foote et al., 2004). In contrast, both sperm and pilot whales potentially ceased sound production during the Heard Island feasibility test (Bowles et al., 1994), although it cannot be absolutely determined whether the inability to acoustically detect the animals was due to the cessation of sound production or the displacement of animals from the area.

Avoidance is the displacement of an individual from an area as a result of the presence of a sound. Richardson et al. (1995) noted that avoidance reactions are the most obvious manifestations of disturbance in marine mammals. Oftentimes, avoidance is temporary and animals return to the area once the noise has ceased. However, longer term displacement is possible and can lead to changes in abundance or distribution patterns of the species in the affected region if animals do not become acclimated to the presence of the chronic sound (Blackwell et al., 2004; Bejder et al., 2006; Teilmann et al., 2006). Acute avoidance responses have been observed in captive porpoises and pinnipeds exposed to a number of different sound sources (Kastelein et al., 2001; Finneran et al., 2003; Kastelein et al., 2006a; Kastelein et al., 2006b). Short-term avoidance of seismic surveys, low-frequency emissions, and acoustic deterrents have also been noted in wild populations of odontocetes (Bowles et al., 1994; Goold, 1996; 1998; Stone et al., 2000; Morton and Symonds, 2002) and to some extent in mysticetes (Gailey et al., 2007), while long-term or repetitive/chronic displacement for some dolphin groups and for manatees has been suggested to result from the presence of chronic vessel noise (Haviland-Howell et al., 2007; Miksis-Olds et al., 2007).

In 1998, the Navy conducted a Low Frequency Sonar Scientific Research Program (LFS SRP) to investigate avoidance behavior of gray whales to low-frequency sound signals. The

objective was to determine whether whales respond more strongly to received levels, sound gradient, or distance from the source, and to compare whale avoidance responses to a low-frequency source in the center of the migration corridor versus in the offshore portion of the migration corridor. A single source was used to broadcast LFA sonar sounds up to 200 dB. The Navy reported that the whales showed some avoidance responses when the source was moored 1.8 km offshore, in the migration path, but returned to their migration path when they were a few kilometers from the source. When the source was moored 3.7 km offshore, responses were much less, even when the source level was increased to 200, to achieve the same received level for most whales in the middle of the migration corridor. Also, the researchers noted that the offshore whales did not seem to avoid the louder offshore source.

Also during the LFS SRP, researchers sighted numerous odontocete and pinniped species in the vicinity of the sound exposure tests with LFA sonar. The mid-frequency and high-frequency hearing specialists present in the study area showed no immediately obvious responses or changes in sighting rates as a function of source conditions. Consequently, the researchers concluded that none of these species had any obvious behavioral reaction to LFA signals at received levels similar to those that produced only minor but short-term behavioral responses in the baleen whales (Clark and Southall, 2009).

Under some circumstances, marine mammals that are exposed to active sonar transmissions will continue their normal behavioral activities; in other circumstances, individual animals will respond to sonar transmissions at lower received levels and move to avoid additional exposure or exposures at higher received levels (Richardson et al., 1995). It is difficult to distinguish between animals that continue their pre-disturbance behavior without stress responses, animals that continue their behavior but experience stress responses (that is,

animals that cope with disturbance), and animals that habituate to disturbance (that is, they may have experienced low-level stress responses initially, but those responses abated over time).

Aicken et al. (2005) monitored the behavioral responses of marine mammals to a new low-frequency active sonar system that was being developed for use by the British Navy. During those trials, fin whales, sperm whales, Sowerby's beaked whales, long-finned pilot whales, Atlantic white-sided dolphins, and common bottlenose dolphins were observed and their vocalizations were recorded. These monitoring studies detected no evidence of behavioral responses that the investigators could attribute to exposure to the low-frequency active sonar during these trials.

Hearing Impairment and Other Physical Effects

Exposure to high intensity sound for a sufficient duration may result in auditory effects such as a noise-induced threshold shift – an increase in the auditory threshold after exposure to noise (Finneran, Carder, Schlundt, and Ridgway, 2005). Factors that influence the amount of threshold shift include the amplitude, duration, frequency content, temporal pattern, and energy distribution of noise exposure. The magnitude of hearing threshold shift normally decreases over time following cessation of the noise exposure. The amount of threshold shift just after exposure is called the initial threshold shift. If the threshold shift eventually returns to zero (i.e., the threshold returns to the pre-exposure value), it is called temporary threshold shift (TTS) (Southall et al., 2007).

Temporary Threshold Shift – TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter, 1985). While experiencing TTS, the hearing threshold rises and a sound must be stronger in order to be heard. At least in terrestrial mammals, TTS can last from minutes or hours to (in cases of strong TTS) days, can be limited to

a particular frequency range, and can be in varying degrees (i.e., a loss of a certain number of dBs of sensitivity). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the noise ends. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals, and none of the published data concern TTS elicited by exposure to multiple pulses of sound. Available data on TTS in marine mammals are summarized in Southall et al. (2007). For the ONR ATE, all cetaceans exposed to underwater sound greater than or equal to 195 dB re 1 μPa^2-second sound exposure level (SEL) are considered to experience TTS (Level B harassment). All pinnipeds exposed to underwater sound greater than or equal to 204 dB re 1 μPa^2-second SEL are considered to experience TTS (Level B harassment). This is consistent with how previous Navy military readiness activities have been analyzed, with the exception of SURTASS LFA/CLFA.

Researchers have derived TTS information for odontocetes from studies on the bottlenose dolphin and beluga. For baleen whales, there are no data, direct or indirect, on levels or properties of sound that are required to induce TTS. The frequencies to which baleen whales are most sensitive are assumed to be lower than those to which odontocetes are most sensitive, and natural background noise levels at those low frequencies tend to be higher. As a result, auditory thresholds of baleen whales within their frequency band of best hearing are believed to be higher (less sensitive) than are those of odontocetes at their best frequencies (Clark and Ellison, 2004). From this, it is suspected that received levels causing TTS onset may also be higher in baleen whales (Southall et al., 2007).

Marine mammal hearing plays a critical role in communication with conspecifics and in interpretation of environmental cues for purposes such as predator avoidance and prey capture.

Depending on the degree (elevation of threshold in dB), duration (i.e., recovery time), and frequency range of TTS and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious. For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that takes place during a time when the animal is traveling through the open ocean, where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during a time when communication is critical for successful mother/calf interactions could have more serious impacts if it were in the same frequency band as the necessary vocalizations and of a severity that it impeded communication. The fact that animals exposed to levels and durations of sound that would be expected to result in this physiological response would also be expected to have behavioral responses of a comparatively more severe or sustained nature is also notable and potentially of more importance than the simple existence of a TTS. For this proposed study, TTS is considered unlikely given: (1) the slow speed of the vessel during activities (less than 5 knots); (2) the motility of free-ranging marine mammals in the water column; (3) the propensity for marine mammals to avoid obtrusive sounds; and (4) the relatively low densities of marine mammals in the proposed nine provinces of the western North Pacific Ocean.

Permanent Threshold Shift – When PTS occurs, there is physical damage to the sound receptors in the ear. In severe cases, there can be total or partial deafness, whereas in other cases, the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter, 1985). There is no specific evidence that exposure to low-frequency active sonar can cause PTS in marine mammals; instead the possibility of PTS has been inferred from studies of TTS on captive marine mammals (Richardson et al., 1995). Single or occasional occurrences of mild

TTS are not indicative of permanent auditory damage, but repeated or (in some cases) single exposures to a level well above that causing TTS onset might elicit PTS.

Relationships between TTS and PTS thresholds have not been studied in marine mammals, but are assumed to be similar to those in humans and other terrestrial mammals. PTS might occur at a received sound level at least several decibels above that inducing mild TTS if the animal were exposed to strong sound pulses with rapid rise times. Based on data from terrestrial mammals, a precautionary assumption is that the PTS threshold for impulse sounds is at least 6 dB higher than the TTS threshold on a peak-pressure basis, and probably greater than six dB (Southall et al., 2007).

Given the higher level of sound necessary to cause PTS as compared with TTS, it is considerably less likely that PTS would occur during the demonstration. ONR's underwater acoustical modeling showed that none of the cumulative energy values exceeded the 215 dB threshold. Therefore, Level A takes of marine mammals are not expected during the ONR ATE.

Non-auditory Physiological Effects – Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, bubble formation, resonance, and other types of organ or tissue damage (Cox et al., 2006; Southall et al., 2007). Studies examining such effects are limited. However, because ONR's modeling shows no exposure to sound levels at or above 215 dB, non-auditory injuries are considered highly unlikely and not discussed further.

Stranding and Mortality

Specific sound-related processes that lead to strandings and mortality are not well documented, but may include:

- Swimming in avoidance of a sound into shallow water;

- A change in behavior (such as a change in diving behavior) that might contribute to tissue damage, gas bubble formation, hypoxia, cardiac arrhythmia, hypertensive hemorrhage or other forms of trauma;
- A physiological change such as a vestibular response leading to a behavioral change or stress-induced hemorrhagic diathesis; leading in turn to tissue damage; and
- Tissue damage directly from sound exposure, such as through acoustically-mediated bubble formation and growth or acoustic resonance of tissues.

Some of these mechanisms are unlikely to apply in the case of impulse sounds. However, there are increasing indications that gas-bubble disease (analogous to the bends), induced in supersaturated tissue by a behavioral response to acoustic exposure, could be a pathologic mechanism for the strandings and mortality of some deep-diving cetaceans exposed to sonar. The cause or causes of most strandings are unknown (Geraci et al., 1976; Eaton, 1979; Odell et al., 1980; Best, 1982). Numerous studies suggest that the physiology, behavior, habitat relationships, age, or condition of cetaceans may cause them to strand or might pre-dispose them to strand when exposed to another phenomenon. These suggestions are consistent with the conclusions of numerous other studies that have demonstrated that combinations of dissimilar stressors commonly combine to kill an animal or dramatically reduce its fitness, even though one exposure without the other does not produce the same result (Chroussos, 2000; Creel, 2005; DeVries et al., 2003; Fair and Becker, 2000; Foley et al., 2001; Moberg, 2000; Relyea, 2005a; 2005b, Romero, 2004; Sih et al., 2004).

Several sources have published lists of mass stranding events of cetaceans in an attempt to identify relationships between those stranding events and military active sonar (Hildebrand, 2004; IWC, 2005; Taylor et al., 2004). For example, based on a review of stranding records

between 1960 and 1995, the International Whaling Commission (2005) identified ten mass stranding events and concluded that, out of eight stranding events reported from the mid-1980s to the summer of 2003, seven had been coincident with the use of mid-frequency active sonar and most involved beaked whales. However, there is no empirical evidence of strandings of marine mammals associated with low-frequency active sonar.

Cox et al. (2006) provided a summary of common features shared by the strandings events in Greece (1996), Bahamas (2000), and Canary Islands (2002). These included deep water close to land (such as offshore canyons), presence of an acoustic waveguide (surface duct conditions), and periodic sequences of transient pulses (i.e., rapid onset and decay times) generated at depths less than 10 m by sound sources moving at speeds of 5.1 knot or more during sonar operations (D'Spain et al., 2006). These features do not relate to the proposed activities.

Anticipated Effects on Marine Mammal Habitat

No ESA-designated critical habitats of any marine mammal species are located in or near the waters of the nine western North Pacific Ocean provinces in which the proposed ONR ATE may be conducted. There are also no international marine mammal protected areas located within the vicinity of the experiment area. During the ONR ATE, only acoustic transducers and receivers as well as standard oceanographic equipment would be deployed. Experimental systems are planned to be retrieved after data collection has been completed. The acoustic and oceanographic instrumentation that would be deployed operates in accordance with all applicable international rules and regulations related to environmental compliance, especially for discharge of potentially hazardous materials. Therefore, no discharges of pollutants would result from the deployment and operation of the acoustic and oceanographic instruments and systems.

During the ONR ATE, deployment and operation of the sound sources would result in no physical alterations to the marine environment other than addition of elevated underwater sound levels, which may have some effect on marine mammals. Any increase in underwater sound levels would be temporary (lasting no more than 2 weeks) and limited in geographic scope. A small number of marine mammals present near the proposed activity may be temporarily displaced due to sound source transmissions. However, concentrations of marine mammals and/or marine mammal prey species are not expected to be encountered in or near the vicinity of the waters in the western North Pacific provinces in which the ONR ATE may occur. There are no critical feeding, breeding, or migrating areas for any marine mammal species that may occur in the proposed action area. No long-term impacts associated with the increase in ambient noise levels are expected.

Proposed Mitigation

In order to issue an incidental take authorization (ITA) under section 101(a)(5)(D) of the MMPA, NMFS must prescribe, where applicable, the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and the availability of such species or stock for taking for certain subsistence uses (where relevant).

The NDAA of 2004 amended the MMPA as it relates to military-readiness activities and the ITA process such that "least practicable adverse impact" shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the "military readiness activity." The training activities described in ONR's application are considered military readiness activities.

ONR has proposed the following mitigation measures to be implemented during the ONR ATE:

Vessel Movement

ONR would maneuver the research vessel, as feasible, to avoid closing within 457 m (1,499 ft) of a marine mammal. Standard operating procedures for the research vessel would be to avoid collision with marine mammals, including maintaining a minimum safe maneuvering distance from detected animals.

Mitigation Zone

ONR proposes to use a 1-km mitigation zone to avoid take by Level A harassment and reduce the potential impacts to marine mammals from ONR ATE. Mitigation zones are measured as the radius from a source and represent a distance that visual observers would monitor during daylight hours to ensure that no marine mammals enter the designated area. The mitigation zone would be monitored for 30 minutes before the active acoustic source transmissions begin and would continue until 30 minutes after the active acoustic source transmissions are terminated, or 30 minutes after sunset, whichever comes first. Visual detections of marine mammals would be communicated immediately for information dissemination and appropriate action, as described directly below.

Delay and Shut-down Procedures

During daytime transmissions, ONR proposes to immediately delay or shut down active acoustic source transmissions if a marine mammal is visually detected within the 1 km exclusion zone. NMFS further proposes that transmissions would not commence/resume for 15 minutes (for small odontocetes and pinnipeds) or 30 minutes (for mysticetes and large odontocetes) after the animal has moved out of the exclusion zone or there has been no further visual detection of

the animal. During nighttime transmissions, ONR proposes to immediately delay or shut down active acoustic source transmissions if a marine mammal is detected using passive acoustic monitoring. NMFS further proposes that transmissions would commence/resume 15 minutes (for small odontocetes and pinnipeds) or 30 minutes (for mysticetes and large odontocetes) after there has been no further detection of the animal.

NMFS has carefully evaluated the applicant's proposed mitigation measures and considered a range of other measures in the context of assuring that NMFS prescribes the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation, including consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Based on our evaluation of the applicant's proposed measures and those proposed by NMFS, we have preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable adverse impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, while also considering personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Proposed Monitoring and Reporting

In order to issue an ITA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth, where applicable, "requirements pertaining to the monitoring and reporting of such taking." The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

Monitoring

ONR proposes to conduct marine mammal monitoring during the proposed activity for the purpose of implementing required mitigation and to provide information on species presence and abundance in the action area. ONR proposes that protected species observers (both visual and acoustic) would maintain a log that includes duration of time spent searching/listening for marine mammals; numbers and species of marine mammals detected; any unusual marine mammal behavior; and the date, time, and location of the animal and any sonobuoy deployments. ONR's proposed Monitoring Plan is described below this section.

Vessel-based Visual Monitoring – ONR proposes to continuously monitor for marine mammals when active acoustic sources are being used during daylight hours. Two visual observers would be on effort during active ATE source transmissions occurring during daylight hours. One observer would be positioned on the deck level above the bridge, about 12 m above the water line, while the second observer would be located on the bridge level, about 9.8 m above the water line. Protected species observers would be trained for visually detecting and identifying marine mammal species. Observers would begin monitoring 30 minutes before the

active acoustic source transmissions are scheduled to begin and would continue until 30 minutes after the active acoustic source transmissions are terminated, or 30 minutes after sunset, whichever comes first.

Passive Acoustic Monitoring – ONR proposes to conduct passive acoustic monitoring from the vessel when active acoustic sources are deployed during nighttime (i.e., no more than 35 hours total) and other periods of decreased visual observation capabilities. Passive acoustic monitoring would include listening for vocalizations and visually inspecting spectrograms of radio frequency-transmitted signals from a deployed AN/SSQ-53 DIFAR sonobuoy by personnel trained in detecting and identifying marine mammal sounds. Passive acoustic monitoring would begin 30 minutes before transmissions are scheduled to begin and continue until 30 minutes after transmissions are terminated, or 30 minutes after sunrise, whichever occurs first.

If a passively detected sound is estimated to be from a marine mammal, the acoustic observer would notify the appropriate personnel and shutdown procedures would be implemented. For any marine mammal detection, the Test Director would order the immediate delay/suspension of the active acoustic source transmissions and/or deployment. NMFS further proposes that transmissions may commence/resume 15 minutes (for small odontocetes) or 30 minutes (for mysticetes and large odontocetes) after there has been no further detection of the animal.

Reporting

ONR proposes that protected species observers (both visual and acoustic) would maintain a log that includes duration of time spent searching/listening for marine mammals; numbers and species of marine mammals detected; any unusual marine mammal behavior; and the date, time, and location of the animal and any sonobuoy deployments. Data would be used to estimate

numbers of animals potentially 'taken' by harassment (as defined in the MMPA). NMFS further proposes that protected species observers record the behavioral state of all marine mammals observed and the status of the active acoustic source when observers see an animal.

ONR would submit two reports to NMFS within 90 days after the end of the proposed activity: one unclassified report and one classified report. The reports would describe the operations that were conducted and sightings of marine mammals near the operations. The reports would provide full documentation of methods, results, and interpretation pertaining to all monitoring. The 90-day reports would summarize the dates and locations of active acoustic source transmissions, and all marine mammal sightings (dates, times, locations, activities, associated active acoustic transmissions). The reports would also include estimates of the number and nature of exposures that could result in 'takes' of marine mammals.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA (if issued), such as an injury (Level A harassment), serious injury, or mortality (e.g., ship-strike, gear interaction, and/or entanglement), ONR would immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Water depth;

- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hrs preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities would not resume until NMFS is able to review the circumstances of the prohibited take. NMFS would work with ONR to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. ONR may not resume their activities until notified by NMFS via letter, email, or telephone.

In the event that ONR discovers an injured or dead marine mammal, and the lead protected species observer determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), ONR would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS. The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS would work with ONR to determine whether modifications in the activities are appropriate.

In the event that ONR discovers an injured or dead marine mammal, and the lead protected species observer determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), ONR would report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS within 24 hours of

the discovery. ONR would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS.

Estimated Take by Incidental Harassment

With respect to military readiness activities, section 3(18)(B) of the MMPA defines "harassment" as: any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered [Level B harassment].

Only take by Level B harassment is anticipated and proposed for authorization as a result of the proposed activity. Acoustic stimuli (i.e., increased underwater sound) generated during the transmission of active acoustic sources have the potential to cause temporary, short-term changes in marine mammal behavior. There is no evidence that the planned activities would result in injury, serious injury, or mortality within the specified geographic area for which ONR seeks the IHA. The mitigation and monitoring measures proposed for implementation are expected to minimize any potential risk for injury or mortality.

To estimate the potential risk of physical auditory or behavioral effects due to the transmissions from the no more than four acoustic sources deployed in one of the nine provinces of the western North Pacific Ocean during the ONR ATE, the Navy performed underwater acoustical modeling and associated analyses. Historically, acoustic exposure thresholds for marine mammal behavior have been just that, fixed thresholds or step functions. However, step functions do not accurately represent most animal behavior. Accurately representing animal

behavior was one of the driving factors in the creation of the behavior risk function (BRF, also known as the risk continuum function), where the probability of significant behavioral response is considered a function of received sound pressure level. This is described in more detail and illustrated in section 6 of the Navy's application. While behavioral response is almost certainly determined by more factors than exposure level, it is also likely that in the limited situation of exposure to acoustic energy when all other contextual factors are known and held constant, received sound level can be used as a proxy for behavioral response.

To estimate the acoustic exposure an animal is likely to receive while the active sources employed in ONR ATE during spring or summer are transmitting, the movement of potentially occurring marine mammals and the acoustic field to which they may be exposed were modeled. The sound fields around the active acoustic sources were estimated based on the details of the active source transmissions and the BELLHOP underwater acoustic propagation model. These data were convolved with simulated marine mammals ("animats") in the Acoustic Integration Model©. Marine mammal species potentially occurring in the nine provinces of the western North Pacific Ocean in which ONR ATE may be conducted were assigned diving and movement behaviors, including dive depth, surfacing time, dive duration, swimming speed, and heading change. Once the animals' behavior was defined, animats were created and randomly distributed over the simulation area determined for each active source. The Acoustic Integration Model© was used to simulate the acoustic exposure for each marine mammal species over the proposed transmissions of each of the active acoustic sources.

To estimate the risk of harassment from each acoustic source, which includes behavior and TTS effects, potentially resulting from exposure to the active acoustic sources employed in ONR ATE, both the maximum received level and the cumulative energy level (sound exposure

level) for each animat from each source were determined. The maximum received level for each animat was inputed into the risk continuum function to estimate Level B harassment. Note that there are two BRFs, one for mysticetes and one for odontocetes and pinnipeds. To determine the potential for TTS and PTS in the marine mammal species potentially occurring in the nine western North Pacific provinces, the modeled sound exposure level values were compared to the appropriate sound exposure level threshold (Table 13). Since TTS is recoverable and is considered to result from the temporary, non-injurious fatigue of hearing-related tissues, it represents the upper bound of the potential for Level B effects. PTS, however, is non-recoverable and, by definition, results from the irreversible impacts on auditory sensory cells, supporting tissues, or neural structures within the auditory system. PTS is thus considered within the potential for Level A effects.

Table 13. Acoustic criteria and thresholds used for predicting physiological effects on marine mammals from exposure to active acoustic sources during the ONR ATE.

Marine Mammal Species	Physiological Effects	
	Onset TTS (MMPA Level B)	Onset PTS (MMPA Level A)
Cetaceans	195 dB re 1 μPa^2-sec	215 dB re 1 μPa^2-sec
Pinnipeds	204 dB re 1 μPa^2-sec	224 dB re 1 μPa^2-sec

In determining the potential effects of the marine mammal species possibly occurring in the nine provinces during spring or summer in which ONR ATE may occur, the Navy made the following assumptions regarding modeling on the underwater acoustic sources:

- Each of the ONR ATE sources was modeled individually and its potential effects computed independent of other experiment activities;

- Acoustic propagation model BELLHOP was used to model the acoustic environment;
- Spring and summer sound velocity profiles from GDEM 2.5 database, the Navy standard database for sound velocity profiles, were used;
- Bathymetry was derived from the ETOP02 database;
- A surface wind speed of 7.7 m/sec (15 knots) was used in the Bechmann-Spezzichino model to estimate surface loss;
- Seafloor properties, including bottom loss, were derived from the Navy standard CBLUG and MGS databases;
- Animal movement parameters for the species occurring in the proposed test area were extracted from the database created by Marine Acoustics, Inc.;
- Densities for marine mammals in the nine provinces of the western North Pacific Ocean were derived using the best available data;
- Animats that encountered the geographic boundaries of the model area "reflected" back into the model area, maintaining a constant overall animat model density; and
- No mitigation was applied to the analysis results.

The precision with which environmental effects can be calculated is largely determined by the accuracy with which the marine mammal densities are estimated for the selected geographic area and season. While the marine mammal densities used in this analysis represent the best available data in spring and summer for the waters of the nine provinces in which the ONR ATE may be conducted, few dedicated marine mammal surveys for the purpose of deriving densities have been undertaken in these waters and only rarely are data available for estimating seasonal populations.

The Navy's analysis conducted on the ONR ATE activities to assess the potential for effects on marine mammals has shown that the possibility of marine mammals being exposed to Level A harassment is not likely. Any impacts to marine mammals are expected to be limited to some masking effects and behavioral responses (Level B harassment) in the areas temporarily ensonified by the active acoustic sources. For all ESA-listed species, the probability of Level B harassment occurring is low, with the highest potential for fin whales; with an estimated 1.7 fin whales potentially experiencing behavioral reactions or TTS from exposure to the active acoustic sources. For non ESA-listed species, the maximum amount of take by Level B harassment for a single species is estimated to be 87 short-beaked common dolphins. The modeled takes for each of the nine provinces are provided in section 6 of the Navy's LOA application. Below is the maximum amount of take expected for any of the nine provinces in the western North Pacific Ocean.

Table 14. Maximum estimated take from exposure to acoustic sources employed during the ONR ATE by marine mammal species potentially occurring in the nine provinces of the western North Pacific Ocean.

Marine Mammal Species	Maximum MMPA Level A Harassment	Maximum MMPA Level B Harassment	Proposed Take by Level B Harassment
Mysticetes			
Blue Whale	0.0000	0.0156	1
Bryde's Whale	0.0000	1.9562	2
Common Minke Whale	0.0000	7.70636	8
Fin Whale	0.0000	1.70956	2
Gray Whale	0.0000	0.0038	1
Humpback Whale	0.0000	1.6395	2

North Pacific Right Whale	0.0000	0.0214	1
Sei Whale	0.0000	1.0446	2
Odontocetes			
Baird's Beaked Whale	0.0000	0.6882	1
Blainville's Beaked Whale	0.0000	0.5985	1
Common Bottlenose Dolphin	0.0000	23.7805	24
Cuvier's Beaked Whale	0.0000	2.2811	3
Dall's Porpoise	0.0000	53.0706	54
Dwarf Sperm Whale	0.0000	4.2209	5
False Killer Whale	0.0000	7.3891	8
Fraser's Dolphin	0.0000	5.7854	6
Ginkgo-toothed Beaked Whale	0.0000	0.5985	1
Hubbs' Beaked Whale	0.0000	0.1928	1
Killer Whale	0.0000	0.1600	1
Kogia spp.	0.0000	2.2840	3
Longman's Beaked Whale	0.0000	0.2993	1
Melon-headed Whale	0.0000	15.4891	16
Mesoplodon spp.	0.0000	0.1928	1
Pacific White-sided Dolphin	0.0000	7.5305	8
Pantropical Spotted Dolphin	0.0000	35.8584	36
Pygmy Killer Whale	0.0000	4.3103	5
Pygmy Sperm Whale	0.0000	1.7203	2
Risso's Dolphin	0.0000	11.3736	12

Rough-toothed Dolphin	0.0000	5.8877	6
Short-beaked Common Dolphin	0.0000	86.3962	87
Short-finned Pilot Whale	0.0000	18.7461	19
Sperm Whale	0.0000	1.6701	2
Spinner Dolphin	0.0000	2.1661	3
Stejneger's Beaked Whale	0.0000	0.2855	1
Striped Dolphin	0.0000	23.9042	24
Pinnipeds			
Hawaiian Monk Seal	0.0000	0.0067	1

ONR developed density estimates for every species possibly occurring in the demonstration area through a multi-step procedure. Direct density estimates from line-transect surveys in or near the demonstration area were used first. When survey-based density estimates were not available, then density estimates for individual species were extrapolated from a region with similar oceanographic characteristics to the demonstration area. For example, the eastern tropical Pacific has been extensively surveyed and provides a comprehensive understanding of the marine mammal populations in temperate oceanic waters (Ferguson and Barlow, 2001 and 2003). If sufficient data were not available, even by extrapolation, then density estimates were pooled for species of the same genus (i.e., Kogia spp.).

Negligible Impact Analysis and Preliminary Determination

NMFS has defined "negligible impact" in 50 CFR 216.103 as "…an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

In making a negligible impact determination, NMFS considers a variety of factors, including, but not limited to:

- The number of anticipated mortalities;
- The number and nature of anticipated injuries;
- The number, nature, intensity, and duration of Level B harassment; and
- The context in which the takes occur.

As mentioned previously, NMFS estimates that 34 species of marine mammals could be affected by Level B harassment during the ONR ATE. No injuries, serious injuries, or mortalities are anticipated to occur as a result of the demonstration, and none are proposed to be authorized. Additionally, for reasons presented earlier in this document, temporary or permanent hearing impairment is not anticipated to occur during the proposed specified activity. Only short-term behavioral disturbance is anticipated to occur due to the limited duration of active acoustic sonar transmissions and the estimated marine mammal densities in the area. ONR's proposed activity would occur for a maximum of 13 days and active acoustic sources would operate intermittently during this time. Due to the nature, degree, and context of behavioral harassment anticipated, the activity is not expected to impact rates of recruitment or survival.

NMFS has preliminarily determined, provided that the aforementioned mitigation and monitoring measures are implemented, that the impact of conducting the ONR ATE, may result, at worst, in a temporary modification in behavior and/or low-level physiological effects (Level B harassment) of certain species of marine mammals.

Of the ESA-listed marine mammals that may potentially occur in the proposed survey area, North Pacific right whale populations lack sufficient data on trends in abundance and sperm whale populations are not well known in the southern hemisphere. There is no designated

critical habitat for marine mammals in the proposed survey area. There are also no known important habitat areas (e.g., breeding, calving, feeding, etc.) for marine mammals known around the area that would overlap with the proposed demonstration. While behavioral modifications, including temporarily vacating the area during the transmission of active acoustic sonar, may be made by these species to avoid the resultant acoustic disturbance, the availability of alternate areas and the short and sporadic duration of the demonstration, have led NMFS to preliminary determine that this action will have a negligible impact on the species in the specified geographic region.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS preliminarily finds that ONR's proposed demonstration would result in the incidental take of marine mammals, by Level B harassment only, and that the total taking from the demonstration would have a negligible impact on the affected species or stocks.

Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses

There are no relevant subsistence uses of marine mammals implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act

Of the species of marine mammals that may occur in the proposed demonstration area, eight are listed as endangered under the ESA: blue whale, fin whale, gray whale, humpback whale, North Pacific right whale, sei whale, sperm whale, and Hawaiian monk seal. Under

section 7 of the ESA, ONR has initiated formal consultation with NMFS, Office of Protected Resources, Endangered Species Act Interagency Cooperation Division, on this proposed demonstration. NMFS' Office of Protected Resources, Permits and Conservation Division, has also initiated formal consultation under section 7 of the ESA with NMFS' Office of Protected Resources, Endangered Species Act Interagency Cooperation Division, to obtain a Biological Opinion evaluating the effects of issuing the IHA on threatened and endangered marine mammals and, if appropriate, authorizing incidental take. NMFS will conclude formal section 7 consultation prior to making a determination on whether or not to issue the IHA. If the IHA is issued, ONR, in addition to the mitigation and monitoring requirements included in the IHA, would be required to comply with the Terms and Conditions of the Incidental Take Statement corresponding to NMFS' Biological Opinion issued to both ONR and NMFS' Office of Protected Resources, Permits and Conservation Division.

National Environmental Policy Act (NEPA)

ONR has prepared a draft Overseas Environmental Assessment (OEA) to address the potential environmental impacts that could occur as a result of the proposed activity. To meet NMFS' National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.) requirements for the issuance of an IHA to ONR, NMFS will prepare an independent NEPA analysis. This analysis will be completed prior to issuance of a final IHA.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to ONR for conducting the ONR ATE in one of nine provinces in this western North Pacific Ocean, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. The proposed IHA language is provided below:

The Office of Naval Research (2000 Navy Pentagon, Washington, DC 20350-2000), is hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1371(a)(5)(D)) to harass marine mammals incidental to the Office of Naval Research (ONR) Acoustic Technology Experiments (ATE) in the western North Pacific Ocean, contingent upon the following conditions:

1. This Authorization is valid from May XX, 2013, through May XX, 2014.
2. This Authorization is valid only for ONR's activities associated with the ATE occurring in the western North Pacific Ocean.
3. Species Impacted and Level of Takes

(a). The incidental taking of marine mammals, by Level B harassment only, is limited to the following species:

(i). Blue whale (Balaenoptera musculus) – 1

(ii). Bryde's whale (Balaenoptera edeni) – 2

(iii). Minke whale (Balaenoptera acutorostrata) – 8

(iv). Fin whale (Balaenoptera physalus) – 2

(v). Gray whale (Eschrichtius robustus) – 1

(vi). Humpback whale (Megaptera novaeangliae) – 2

(vii). North Pacific right whale (Eubalaena japonica) – 1

(viii). Sei whale (Balaenoptera borealis) – 2

(ix). Baird's beaked whale (Berardius bairdii) – 1

(x). Blainville's beaked whale (Mesoplodon densirostris) – 1

(xi). Bottlenose dolphin (Tursiops truncatus) – 24

(xii). Cuvier's beaked whale (Ziphius cavirostris) – 3

(xiii). Dall's porpoise (Phocoenoides dalli) – 54

(xiv). Dwarf sperm whale (Kogia sima) – 5

(xv). False killer whale (Pseudorca crassidens) – 8

(xvi). Fraser's dolphin (Lagenodelphis hosei) – 6

(xvii). Gingko-toothed beaked whale (Mesoplodon ginkgodens) – 1

(xviii). Hubb's beaked whale (Mesoplodon ginkgodens) – 1

(xix). Killer whale (Orcinus orca) – 1

(xx). Kogia spp. – 3

(xxi). Longman's beaked whale (Indopacetus pacificus) – 1

(xxii). Melon-headed whale (Peponocephala electra) – 16

(xxiii). Mesoplodon spp. – 1

(xxiv). Pacific white-sided dolphin (Lagenorhynchus obliquidens) – 8

(xxv). Pantropical spotted dolphin (Stenella attenuata) – 36

(xxvi). Pygmy killer whale (Feresa attenuata) – 5

(xxvii). Pygmy sperm whale (Kogia breviceps) – 2

(xxviii). Risso's dolphin (Grampus griseus) – 12

(xxix). Rough-toothed dolphin (Steno bredanensis) – 6

(xxx). Short-beaked common dolphin (Delphinus delphis) – 87

(xxxi). Short-finned pilot whale (Globicephala macrorhynchus) – 19

(xxxii). Sperm whale (Physeter macrocephalus) – 2

(xxxiii). Spinner dolphin (Stenella longirostris) – 3

(xxxiv). Stejneger's beaked whale (Mesoplodon stejnegeri) – 1

(xxxv). Striped dolphin (Stenella coeruleoalba) – 24

(xxxvi). Hawaiian monk seal (Monachus schauinslandi) – 1

(xxxvii). If any marine mammal species are encountered during ONR ATE activities that are not listed here for authorized taking and are likely to be exposed to sound pressure levels (SPLs) greater than or equal to 160 dB re 1 μPa (rms), then the Holder of this Authorization must alter speed or course, or shut-down equipment to avoid take.

(b). The taking by injury (Level A harassment), serious injury, or mortality of any of the species listed in Condition 3(a) above or the taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this Authorization.

4. The methods authorized for taking, by Level B harassment only, are limited to four underwater acoustic sources with transmission frequencies below 1.5 kHz and sound pressure levels less than 220 dB.
5. The taking of any marine mammal in a manner prohibited under this Authorization must be reported immediately to the Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service (NMFS) or his designee, at 301-427-8401.
6. Mitigation Requirements: The Holder of this Authorization is required to implement the following mitigation requirements when conducting the specified activities to achieve the least practicable impact on affected marine mammal species or stocks:

(a). Vessel movement – The Holder shall maneuver the research vessel, as feasible, to avoid closing within 457 m (1,499 ft) of a marine mammal.

(b). Mitigation zone – During operation of active acoustic sources, a 1-km mitigation zone shall be established around the sound source. This area will be continuously monitored by

visual observers during daylight hours for marine mammals 30 minutes before transmissions begin, during transmissions, and for 30 minutes after transmissions are terminated, or 30 minutes after sunset (whichever comes first). Shutdown procedures will occur if a marine mammal is visually detected within the 1-km zone.

(c). Delay and shutdown procedures – During daytime transmissions, active acoustic source transmissions shall be immediately delayed or shut down if a marine mammal is visually detected within the 1-km mitigation zone. Transmissions would not commence/resume for 15 minutes (for small odontocetes and pinnipeds) or 30 minutes (for large whales) after the animal has moved out of the mitigation zone or there has been no further visual detection of the animal.

During nighttime transmissions, active acoustic source transmissions shall be immediately delayed or shutdown if a marine mammal is detected using passive acoustic monitoring. Transmissions would not commence/resume for 15 minutes (for small odontocetes and pinnipeds) or 30 minutes (for large whales) after there has been no further detection of the animal.

7. Monitoring Requirements: The Holder of this Authorization is required to implement the following monitoring requirements when conducting the specified activities to result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the action area.

(a). Visual monitoring – During daylight hours, two protected species observers shall continuously monitor for marine mammals when active acoustic sources are being used. One observer shall be positioned on the deck level above the bridge and the second observer shall be positioned on the bridge level. Monitoring shall begin 30 minutes before active acoustic source transmissions are scheduled to commence and shall continue until 30 minutes after active acoustic source transmissions are terminated, or 30 minutes after sunset (whichever comes first).

(b). Passive acoustic monitoring – During nighttime hours (and any other periods of decreased visual observation capabilities), the Holder shall conduct continuous passive acoustic monitoring when active acoustic sources are being used. Passive acoustic monitoring shall include listening for vocalizations and visually inspecting spectrograms of radio frequency-transmitted signals from a deployed sonobuoy by personnel trained in detecting and identifying marine mammal sounds. Monitoring shall begin 30 minutes before active acoustic source transmissions are scheduled to commence and shall continue until 30 minutes after active acoustic source transmissions are terminated, or 30 minutes after sunrise (whichever comes first).

If a passively detected sound is estimated to be from a marine mammal, the acoustic observer shall notify the appropriate personnel and shutdown procedures shall be implemented. For any marine mammal detection, the appropriate personnel shall order the immediate delay/suspension of the active acoustic source transmissions and/or deployment. Transmissions may commence/resume 15 minutes (for small odontocetes and pinnipeds) or 30 minutes (large whales) after there has been no further detection of the animal.

8. Reporting Requirements: The Holder of this Authorization is required to:

(a). Submit two reports on all activities and monitoring results to the Office of Protected Resources, NMFS, within 90 days after the end of the specified activity: one unclassified report and one classified report. This report must contain and summarize the following information for when a marine mammal sighting is made:

(i). Dates, times, locations, heading, speed, weather, sea conditions (including Beaufort sea state and wind force), and associated activities during all active acoustic transmissions and marine mammal sightings;

(ii). Species, group size, age, individual size, sex (if determinable) of all marine mammal sightings;

(iii). Behavior of animal when first sighted, subsequent behaviors, and status of active acoustic sources;

(iv). Bearing and distance of observation from the vessel, sighting cue, and exhibited reaction to the active acoustic transmission or vessel (e.g., none, avoidance, approach, etc.), behavioral pace, and depth at time of detection;

(v). Fin/fluke characteristics and angle of fluke when an animal submerges to determine if the animal executed a deep or surface dive;

(vi). Type and nature of sounds heard;

(vii). Any other relevant information;

(viii). An estimate of the number (by species) of marine mammals that are known to have been exposed to active acoustic transmissions (based on visual observation and passive acoustic monitoring) at received levels greater than or equal to 195 dB re 1 μPa^2-second SEL with a discussion of any specific behaviors those individuals exhibited; and

(ix). A description of the implementation and effectiveness of the mitigation measures of the Incidental Harassment Authorization.

(b). When shutdown is required for mitigation purposes, the following information will also be recorded:

(i). The basis for decisions resulting in shutdown of active acoustic transmissions;

(ii). Information needed to estimate the number of marine mammals potentially taken by harassment;

(iii). Information on the frequency of occurrence, distribution, and activities of marine mammals in the demonstration area;

(iv). Information on the behaviors and movements of marine mammals during and without operation of active acoustic sources; and

(v). Any adverse effects the shutdown had on the demonstration.

(c). Submit a final report to the Chief, Permits and Conservation Division, Office of Protected Resources, NMFS, 1315 East West Highway, Silver Spring, Maryland, 20910, within 30 days after receiving comments from NMFS on the draft report. If NMFS decides that the draft report needs no comments, the draft report shall be considered the final report.

(d). In the unanticipated event that the specified activity clearly cause the take of a marine mammal in a manner prohibited by this Authorization, such as an injury (Level A harassment), serious injury, or mortality (e.g., ship-strike, gear interaction, and/or entanglement), ONR shall immediately cease operations and report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Michael.Payne@noaa.gov and Michelle.Magliocca@noaa.gov. The report must include the following information:

(i) Time, date, and location (latitude/longitude) of the incident;

(ii) The name and type of vessel involved;

(iii) The vessel's speed during and leading up to the incident;

(iv) Description of the incident;

(v) Status of all sound source use in the 24 hours preceding the incident;

(vi) Water depth;

(vii) Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);

(viii) Description of marine mammal observations in the 24 hours preceding the incident;

(ix) Species identification or description of the animal(s) involved;

(x) The fate of the animal(s); and

(xi) Photographs or video footage of the animal (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with ONR to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. ONR may not resume their activities until notified by NMFS via letter, email, or telephone.

(e). In the event that ONR discovers an injured or dead marine mammal, and the lead protected species observer determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), ONR shall immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401, and/or by email to Michael.Payne@noaa.gov and Michelle.Magliocca@noaa.gov. The report shall include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with ONR to determine whether modifications in the activities are appropriate.

(f). In the event that ONR discovers an injured or dead marine mammal, and the lead protected species observer determines that the injury or death is not associated with or related to the activities authorized in Condition 2 of this Authorization (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), ONR shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401, and/or by email to Michael.Payne@noaa.gov and

Michelle.Magliocca@noaa.gov within 24 hours of the discovery. ONR shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. Activities may continue while NMFS reviews the circumstances of the incident.

9. The Holder of this Authorization is required to comply with the Terms and Conditions of the Incidental Take Statement (ITS) corresponding to NMFS' Endangered Species Act Biological Opinion issued to both the Office of Naval Research and NMFS' Office of Protected Resources.
10. A copy of this Authorization must be in the possession of all contractors and protected species observers operating under the authority of this Incidental Harassment Authorization.
11. Penalties and Permit Sanctions

Any person who violates any provision of this Incidental Harassment Authorization is subject to civil and criminal penalties, permit sanctions, and forfeiture as authorized under the MMPA.

Dated: March 28, 2013

Helen M. Golde,
Acting Director, Office of Protected Resources,
National Marine Fisheries Service.

[FR Doc. 2013-07606 Filed 04/01/2013 at 8:45 am; Publication Date: 04/02/2013]